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PECTIC SUBSTANCE OF COTTON FIBERS IN RELATION TO GROWTH

It has long been known that cotton fibers represent single plant cells and that the growing fibers pass through certain distinct stages of development. The initial growth-phase consists in the development of the primary cell wall which serves as a protective coating for the cell during its subsequent development. With the completion of the primary wall, the secondary cell wall begins to develop. This process appears to consist in the deposition of cellulose. It is this secondary cell wall which is the commercially important part of the cotton fiber.

One part of the general research program, undertaken by the Textile Foundation at the Bureau on the chemical and physical properties of textile fibers, has been an investigation of the location and role of the various constituents of cotton fibers. The development of an analytical method for the accurate determination of uronic acids has made it possible to study in some detail the pectic substance of cotton. Since it has been suggested by other investigators that the pectic substance occurs mainly in the primary cell wall, it appeared that more exact information could be obtained by determining the percentage of pectic substance at various stages of growth during the development of the fiber. If it is assumed that the pectic substance is largely confined to the primary cell wall, it would be expected that very young cotton fibers would contain a high percentage of pectic substance and that the percentage would decrease as fiber development progressed, and would reach its lowest value at the time of fiber maturity.

[1] Published with approval of the Director of the Budget.

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The analysis of two series of cotton fibers by Roy L. Whistler and Albert R. Martin, of the Textile Foundation, working with Carl M. Conrad, of the Department of Agriculture, revealed that during the period of fiber elongation and primary wall formation, which continues until the fiber reaches an age of 18 to 20 days, the percentage of pectic substance was at its highest value and remained approximately constant. At the end of this period the percentage of pectic substance suddenly began to decline rapidly. This point was taken to indicate the beginning of the second phase of fiber growth which consists in the rapid deposition of cellulose to form the secondary cell wall. The steady decline in the percentage of pectic substance, which continued until the fibers reached an age of about 35 days, indicated that cellulose was continually being deposited during this time. From the 35th day until the time the boll opened, little change in the percentage of pectic substance occurred. It was, therefore, assumed that at 35 days the growth of fibers had been practically completed, and that but little change occurred thereafter. The three stages of development are in good agreement with those deduced by other investigators from different types of data.

The complete report of this work will appear in the Journal of Research for September (RP1326) and in Textile Research and American Dyestuff Reporter.

X-RAY STUDIES OF SILK FIBERS

Studies of the diffraction of X-rays by natural silk fibers have been made at the Bureau in order to gain further information about the complex internal structure of these fibers. The diffraction phenomena reveal the presence of definite crystalline arrangements of atomic or molecular units in parts of the fiber structure.

Work was done on a *Bombyx mori* (cultivated) type of silk and on a *Tussah* (wild) silk, which were found to differ markedly in their crystalline organization. These differences were measured for the main body of the fiber, the fibroin component, and the results expressed in terms of crystal lattice constants. The outer layer of the fiber, the sericin component, was found to exist on the fiber in a lower degree of crystallization, relative to that of the fibroin component, and with a more random orientation of the minute crystallites.

A comparison was also made of the diffraction of X-rays by silks of hard and soft nature, but the data obtained did not reveal any marked differences in diffractive properties.

PERMEABILITY OF ELASTIC POLYMERS TO HYDROGEN

The number of synthetic polymers which are characterized by elastic extensibility is constantly increasing. The fact that these materials possess physical properties suggesting their usefulness as gas-impeding films in balloons and airships, with the added advantage that several of them have been shown to be less permeable than rubber to gases, has stimulated further interest in new types of these materials. At the request of the Bureau of Aeronautics, U. S. Navy Department, the permeabilities to hydrogen of these polymers has been measured. The following materials were found to diminish in the order in which they are listed: Natural rubber, Perbunan, Neoprene *G*, Vistanex, Thiokol *Dx*, and Pliofilm. The permeabilities were determined at various temperatures, and the increase in the rate of permeation with increase in temperature was found to be exponential in all cases. The activation energies of permeability for hydrogen were shown to be about 6,800 cal/mole for natural rubber and 8,400 to 9,500 cal/mole for the synthetic substances. A possible explanation for the magnitude of the energy requirements of the synthetic materials is the differences in their molecular structure.

In RP1327 in the September number of the Journal of Research, Theron P. Sager, of the Bureau's Chemistry Division, emphasizes the fact that the practical application of these materials is conditioned by properties other than their permeability to gas, and that in this respect no material thus far commercially available may be regarded as ideal. It is a promising circumstance, however, that many synthetic materials are capable of great variations in their physical properties which affect their utility but do not appreciably alter their typical rates of penetration.

ABSORPTION OF WATER BY PLASTICS

A method of measuring the absorption of water by plastics has been prepared by Subcommittee V of Committee D–20 on Plastics of the American Society for Testing Materials, working in cooperation with Subcommittees II and III of Committee D–9 on Electrical Insulating Materials. This method has been adopted as a Tentative Standard

and replaces the short-time water absorption tests provided in D48–39 for molded insulating materials, D229–39 for sheet and plate materials, D349–39 for laminated round rods, and D348–39 for laminated tubes.

Experimental data obtained in an exploratory investigation at the Bureau on the absorption of water by plastics in connection with the preparation of the above test method are summarized in a paper by G. M. Kline, A. R. Martin, and W. A. Crouse, which will appear in the Proceedings of the ASTM. These data pertain to the effects of various conditioning procedures, times of immersion, and prior history of the specimens on the values observed for water absorption by plastics. The plastics examined were: Phenol-formaldehyde molded, cast, and paper-base laminated materials; ureaformaldehyde molded and paper-base laminated materials; casein; cellulose nitrate; cellulose acetate; ethylcellulose polyvinyl, chloride-acetate; polyvinyl butyral; polystyrene in molded and cast forms; polymethyl methacrylate; and cold-molded plastics of the bituminous and phenolic types.

Data are presented on the rates of absorption and desorption of water by these plastics for periods up to 2 years. The variations in the dimensions of the specimens that are produced by these changes in moisture content are recorded.

NATURE OF GLASS IN PORTLAND CEMENT CLINKER

In J. Research NBS 21, 355 (1938) (RP1135), a method was described for determining quantitatively the phases in portland cement clinker by the microscopical analysis of polished surfaces of clinker after etching. The results of the quantitative microscopical analyses of a number of samples of commercial portland cement clinkers were compared with the results obtained by the calculation of constituents from chemical analysis. For a few of these samples the values for glass obtained microscopically were compared with the values found by an independent method involving the heat of solution of the clinkers (J. Research NBS 20, 77 (1938) (RP1066)). It was found that the values for "light interstitial" material obtained microscopically were, for many samples, considerably in excess of those for $4CaO.Al_2O_3.Fe_2O_3$ calculated from the chemical composition, whereas the values for glass obtained microscopically were less than those found by the heat-of-solution method. It was concluded in RP1135 that the "light interstitial" material was a single phase because none of the etching reagents used caused any differentiation of this material.

Since the publication of that paper renewed attempts have been made to find reasons for the discrepancies between the results of the microscopical analysis and of the other methods used. This has led to a search for reagents that might attack the "light interstitial" material. The most satisfactory reagent found is a 10-percent solution of KOH. The polished specimen is agitated in this solution for 15 seconds at a temperature of 29° C. Microscopical examination of polished thin sections of clinker etched with the alkaline solution shows definitely that the etched portions of the interstitial material are composed of an isotropic substance with high index of refraction and dark-green color, properties of an iron-bearing glass, while the unetched portions are distinctly birefringent with optical properties characteristic of the compound $4CaO.Al_2O_3.Fe_2O_3$. It is assumed from the optical properties that the etched material is a glass containing a high percentage of iron and that the unetched material is essentially the crystalline compound.

The clinker specimens analyzed microscopically in RP1135 have been reanalyzed after etching with the new reagent. The results are given in a paper by Herbert Insley (RP1324) in the September number of the Journal of Research, together with a detailed description of the etching technique and photomicrographs showing the effects of the reagent on the polished specimens. The reanalysis gives lower values for "light interstitial" material ($4CaO.Al_2O_3.Fe_2O_3$) and higher values for glass than the first microscopical analysis for samples with Al_2O_3/Fe_2O_3 ratios lower than 2.00, whereas the results are about the same for ratios higher than 2.00. The values for glass by the second analysis are more nearly in agreement with the values found by the heat-of-solution method.

DECOMPOSITION OF ROCKS AND CERAMIC MATERIALS FOR CHEMICAL ANALYSIS

Materials such as rocks and refractories that are insoluble in acids are usually decomposed for chemical analysis by fusing with 4 to 10 times their weight of sodium carbonate. Recent tests, by James I. Hoffman, show that practically all rocks and ceramic mate-

rials, except highly ignited alumina, can be decomposed by heating 1 part of sample with 2 parts of sodium carbonate for 15 minutes at 1,200° C. The fusion is made in a 75-ml platinum dish instead of a crucible. If silicate is to be determined, the same dish is used for the fusion, the disintegration of the melt with hydrochloric acid, the evaporation to dryness, and the ignition of the silica.

The complete report on this method will be published as RP1331 in the Journal of Research for September.

ENERGIES OF ISOMERIZATION OF THE FIVE HEXANES

In continuing the study of the thermochemistry of the paraffin hydrocarbons, new data have been obtained on the heats of combustion of each of the five isomeric hexanes. From these and other data, values have been calculated for the following: The energies of isomerization for the liquid state at 25° C and for the gaseous state at 0°, 298°, 600°, and 1,000° K; the free energies of isomerization for the gaseous state at 298°, 600°, and 1,000° K; and for the relative amounts of the isomers present at equilibrium with one another at 298°, 600°, and 1,000° K.

Numerical values for these thermodynamic properties are needed:

(1) In the study of the energies of their atomic linkages.

(2) In finding the conditions under which maximum amounts of the more highly branched paraffin hydrocarbons can be obtained. This knowledge is essential in the production of automotive fuels having a high degree of freedom from knock.

These numerical values are given by Frederick D. Rossini and Edward J. R. Prosen in a letter to the Editor in the August number of the Journal of the American Chemical Society. The complete details of the experimental work and calculations will appear later in the Journal of Research.

THICKNESS OF ADHERING LIQUID FILM

When a solid body is immersed in a liquid and slowly withdrawn, a film of the liquid adheres to the solid surface and is carried up with the solid, gradually draining back when the motion ceases. This condition is frequently encountered in physical apparatus, particularly in gas measurements, where a measuring chamber is sealed off by a liquid. In precise measurements it is necessary to make a small correction due to the volume of the liquid left adhering to the walls. A similar example is the correction to be applied to volumetric tanks used to measure liquids. When such tanks are drained, a liquid film remains on the walls of the tank. Industrially, the painting of objects by dipping is a familiar example.

Attempts by Francis C. Morey, of the Gas Measuring Instruments Section, to use relationships published by other investigators in computing corrections to be applied in calibrating cubic foot standards were not entirely satisfactory. Experiments to determine the amount of liquid adhering to a metal surface as it is withdrawn from a bath of liquid were, therefore, undertaken.

A thin cylinder of brass, approximately 27 cm. long and 6.5 cm. in diameter, was suspended from one arm of an analytical balance and was counterbalanced by a tare weight. A movable platform carrying the liquid bath was arranged so that the cylinder could be immersed for accurately measured distances of 3, 5, 10, 15, or 25 cm. The platform could be lowered at seven uniform rates of speed, ranging from about 0.1 to 1.4 cm. per second. The gain in weight of the cylinder after an immersion and withdrawal represents the amount of oil adhering to the two surfaces of the cylinder.

Nine liquids were investigated, including mineral, animal, and vegetable oils, and synthetic organic compounds of oily nature. A wide range of viscosities was encountered and it was found that the data obtained overlapped, so that liquids of low viscosity at higher speed gave results nearly identical with those of more viscous liquids from which the withdrawal was slower.

Upon analysis of the data, it was found that the results could be expressed most conveniently by the following empirical equation:

$$t = k\frac{l+b}{l}(\nu s^n),$$

in which t=average film thickness, l=length of immersion, ν=kinematic viscosity of the liquid, s=speed of withdrawal, and k, b, and n are constants, depending upon the liquid used. The values of k and n for the liquids tested are approximately 0.015 and 0.63, respectively. The quantity of b is small, and is probably due largely to the effect of the capillary elevation of the surface of the liquid in contact with the test cylinder. This elevation of the surface tends to increase the length of immersion, and naturally is a greater percentage when the length is small.

When the surface in question is not removed from the liquid bath, the capillary elevation at the beginning and end of the motion is the same, so that the equation simplifies to

$$t=k(vs^n),$$

The fact that for a given speed and viscosity the average film thickness is a constant does not necessarily imply that the film is of uniform thickness. In fact, this experiment is incapable of determining the profile of the film. Jefferys' solution of a parabolic profile is entirely possible, since the mean ordinate of a parabolic section is equal to two-thirds of the maximum ordinate of that section. The solution is not compatible with that of Gaucher and Ward, who found that the thickness varies with the square root of the product of viscosity and speed of withdrawal.

For the complete account of this work, RP1332 in the September Journal of Research should be consulted.

CYANIDE PLATING BATHS

The cyanide plating baths are important commercially for the deposition of copper, silver, gold, zinc, cadmium, and alloys, such as brass. They are prepared by dissolving a salt (usually the cyanide) of the heavy metal in a solution of alkali (sodium or potassium) cyanide. On dissolving, chemical combination takes place between the heavy metal cyanide and the alkali cyanide with the formation of one or more soluble complex cyanides. The problem of the constitution of the baths consists in identifying these metallocyanide complexes in solution. Knowledge of constitution is to a considerable degree necessary for understanding the properties and method of operation of the baths, and for predicting the direction of improvement or development to be based upon research.

A paper by M. R. Thompson, which has been submitted for publication in the Transactions of the American Electrochemical Society, reviews and summarizes much of the available information on cyanide plating baths. A discussion is given of the relation between probable constitution, analytical control, and certain operating characteristics (such as current efficiency and polarization) of cyanide solutions of most of the heavy metals which form stable cyanides. A summary of the constitution of the cyanide plating baths is included, but any such list cannot be exact at this time and may need revision as new data are obtained.

INDUSTRIAL USES FOR SILVER

Although this research, sponsored at the Bureau and elsewhere by the American Silver Producers, was formally closed on May 31, 1940, the final report was issued during July. This is a book of over 600 pages, entitled "Silver in Industry." It was prepared by Lawrence Addicks, A. J. Dornblatt, and other members of the research staff of the project, and summarizes the results obtained at the Bureau and in the other cooperating laboratories, the work of which has been described in previous numbers of this Bulletin. General information on silver is also included.

The book has been privately published, by the Reinhold Publishing Corp., 330 West 42d Street, New York, N. Y., and inquiries should be addressed to that firm.

CORROSION CHARACTERISTICS OF WROUGHT ALUMINUM ALLOYS

Duralumin alloys are susceptible to two types of corrosion. Corrosive attack may follow the crystal boundaries of the metal and thus seriously reduce its strength and resistance to shock. On the other hand, material of the same composition that has been given a different heat treatment may be susceptible only to the pitting type of attack, which is generally less damaging to the strength of the alloy than the intercrystalline type. The customary method of determining the type of attack that may develop in duralumin is to immerse the material for several hours in a solution that accelerates corrosion, and then to examine the sample with a metallographic microscope. This method is time-consuming and destroys the sample. There is a need for a rapid, nondestructive test to determine whether, for example, the metal in the wing covering of an airplane is susceptible to intercrystalline corrosion.

Because the electrochemical potential of duralumin in a salt solution is different for similar samples that have been given different heat treatments, the measurement of these potentials has been suggested as a means of predicting the type of corrosion that may occur. To determine the reliability of such predictions, Hugh L. Logan has measured the potentials of many samples of material, some known to be susceptible only to pitting, and others known to be susceptible to intercrystalline corrosion. In the Journal of Re-

search for September (RP1328), it is shown that samples having potentials more negative than —0.657 volt, against a saturated calomel electrode, were generally susceptible to intercrystalline corrosion. Conversely, materials having less negative potentials were generally immune to intercrystalline corrosion and susceptible only to pitting. As the test method is delicate and requires a scientifically trained operator, it is primarily useful in the laboratory and not in the shop.

EXTENSION OF "PACK" METHOD FOR COMPRESSIVE TESTS OF THIN MATERIALS

The "pack" method for determining compressive stress-strain graphs, described in Technical News Bulletin 266 (June 1939) has been modified so that it is now applicable to thinner gages and stronger materials. The principal modifications are the provision of additional support against instability by cementing the specimens of the pack together with fused shellac, and the provision of special clamps which hold the specimens in the pack together while the test is in progress. The shellac was found to increase the buckling load of the pack without any appreciable effect on the compressive stress-strain graph of the material. These improvements have made possible the application of stresses in excess of 220,000 lb/in.^{2} to sheet material having a thickness of only 0.02 in.

AN INTEGRATING CIRCUIT FOR TUBE COUNTERS

In the Journal of Research for September (RP1330) Leon F. Curtiss describes a circuit for integrating the pulses from tube counters filled with alcohol vapor and argon and measuring the output on a rugged milliammeter. These counter tubes require no external quenching device; therefore a simple resistance capacity-coupled amplifier is arranged to amplify and level the pulses. They are then rectified and fed into a condenser with resistance leak. A vacuum tube voltmeter stage is incorporated in the circuit to measure the voltage of this condenser. This voltage is proportional to the counting rate under the conditions obtained in this circuit.

Two types of portable apparatus, operated from the 110-volt alternating-current supply, which use the circuit outlined above, are described. One is a sensitive counter unit suitable for measuring low gamma-ray intensities, down to the equivalent of 0.1 microgram of radium. The output meter is a milliammeter with a full-scale deflection of 1.5 milliampere. A multirange switch permits operation at several sensitivities. On the most sensitive range the sensitivity is 0.03 milliampere per microgram of radium at 1 meter. The scale of the meter is linear with the counting rate so that comparisons between radioactive sources can be made when desired without reference to the calibration curve. A carefully prepared calibration curve can be used to determine gamma-ray intensities, in this region to within a few percent. The calibration remains comparatively steady over periods of months.

The other apparatus, based upon the same circuit, is a dosage meter for gamma rays, which indicates on a milliammeter the gamma-ray dosage in terms of roentgens per day, and, in addition, gives a visual and audible alarm when this dosage reaches the tolerance level of 0.1 roentgen per day. This equipment is designed to give warning of excessive general exposures wherever large sources of gamma radiation are present, such as in the use of radium, high-voltage tubes, and cyclotrons.

IMPROVEMENT IN RADIOSONDE

The audio-modulation-type radiosonde, as originally developed for the Navy Department, was described in Technical News Bulletin 251 (March 1938). The experiments by the Weather Bureau, Navy Department, and Coast Guard during 1938–39 showed the value of this method of radio sounding. The service has since been expanded to include 35 land and 10 shipboard stations, using more than 1,000 radiosondes per month.

Advantages of the radiosonde over the airplane method of sounding include: Greater regularity of operation under adverse visibility conditions; ability to make aerological soundings from restricted areas, such as ships at sea, small islands, rough terrain, etc.; and much greater heights attained (3 to 4 times) without appreciably increasing the time taken for a sounding. During a year of operation, only about 1 percent of the soundings were cancelled because of instrument failures or adverse

weather conditions. Despite the widespread dispersion of the stations in use, only about 4 percent of the radiosondes were in any degree damaged in shipment, and 95 percent of the soundings gave satisfactory records. An analysis of over 5,000 soundings shows that over 90 percent reached heights of 10 kilometers (6.21 miles) and 70 percent reached heights of 15 kilometers (9.32 miles). Laboratory and flight data on the performance of the radiosonde show that the pressure measurements are accurate within 5 millibars, the temperature measurements within 0.75° C down to —50° C, and the humidity measurements within 5-percent relative humidity when discounting the lag in response of the hair hygrometer.

Since the radiosonde was first used important improvements have been developed, such as the simplification of the transmitter, thermal insulation of the battery, refinement of the transmitter and temperature element, so that they can be manufactured to sufficiently close tolerances to eliminate the need for individual calibration, and use of an electric hygrometer for measuring relative humidity. The new instrument is already in service at nine Navy Department stations and has proved to be superior in performance to the older type.

The electric hygrometer, briefly described in Technical News Bulletin 272 (December 1939), possesses important advantages over the hair hygrometer. While the latter does not function effectively at temperatures below about 0° C, the electric hygrometer is characterized by a rapid response to humidity variations at temperatures down to —60° C. At 0° C, its time-lag constant is only 11 seconds compared with 195 seconds for the hair hygrometer. The much greater speed of response of the pressure and temperature elements allows the use of balloon ascension rates up to 400 meters per minutes compared with 175 meters per minute hitherto used. This reduces the time taken for a sounding, the battery capacity required, the variation of the radio frequency, and the wind drift of the balloon. Wind drift appears to be the primary limitation on heights attained with the older type instrument, because of the attendant reduction in radio-field intensity at the receiving antenna. Thus, during the winter months, January, February, and March, when high winds prevail, only 25 percent of the soundings reached 17 kilometers, whereas some 70 percent reached this height during August and September when the winds are relatively low.

Extensive data on the performance of the component elements of the improved radiosonde are given in a paper (RP1329) by Harry Diamond, Wilbur S. Hinman, Jr., Francis W. Dunmore, and Evan G. Lapham in the September number of the Journal of Research.

PREFABRICATED WOOD-FRAME CONSTRUCTIONS

Tests have been completed in collaboration with the Forest Products Laboratory on 39 specimens of prefabricated wood-frame wall, partition, and floor constructions, submitted by American Houses, Inc.

The wall and load-bearing partition specimens were subjected to compressive, transverse, concentrated, impact, and racking loads; the nonload-bearing partition specimens to impact and concentrated loads; and the floor specimens to transverse, concentrated, and impact loads. The results are presented graphically and in tables in Building Materials and Structures Report BMS47. Copies are obtainable for 10 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

STRUCTURAL PROPERTIES OF "MUNLOCK DRY WALL BRICK" MASONRY WALL CONSTRUCTION

Building Materials and Structures Report BMS53 describes the Bureau's tests on 12 specimens representing a wall construction of "Munlock Dry Wall Brick" submitted by the Munlock Engineering Co.

Compressive, transverse, concentrated, impact, and racking loads were applied, simulating those to which the elements of a house would be subjected, three like specimens having been tested under each condition. The deformation under load and the set after its removal were measured for uniform increments of load. The results are presented in graphs and in tables.

The price of BMS53 is 10 cents; copies are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C.

STRUCTURAL PROPERTIES OF "TILECRETE TYPE A" FLOOR CONSTRUCTION

Building Materials and Structures Report BMS51 describes tests recently completed on six specimens representing "Tilecrete Type A" floor construction submitted by the Tilecrete Co.

In this steel-reinforced concrete construction no forms are required during erection; the steel, which is placed first, is self-supporting, and on it the concrete is poured.

Transverse, impact, and concentrated loads were applied to the specimens, simulating the loads to which the elements of a house would be subjected. For each of the loads three like specimens were tested. The deformation under load and the set after its removal were measured for uniform increments of load. The strength under transverse load was also determined. The results are presented in graphs and in a table.

Copies of BMS51 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

NEW AND REVISED PUBLICATIONS ISSUED DURING AUGUST 1940

Research Papers [2]

[Reprints from the June 1940 Journal of Research]

RP1302. Theory of a single-layer, bifilar, absolute standard of mutual inductance. Chester Snow. Price 10 cents.

RP1304. Moisture relations of textile fibers at elevated temperatures. James G. Wiegerink. Price 5 cents.

RP1305. Tests of corrosion inhibitors for water treatment in air-conditioning equipment. James H. Wilson and Edward C. Groesbeck. Price 5 cents.

RP1306. Preparation and some physical properties of 2,2,4,4-tetramethylpentane. Frank L. Howard. Price 5 cents.

RP1308. Influence of austenitic grain size on the critical cooling rate of high-purity iron-carbon alloys. Thomas G. Digges. Price 10 cents.

RP1309. Microscopic examination of cotton fibers in cuprammonium hydroxide solutions. Charles W. Hock and Milton Harris. Price 5 cents.

Building Materials and Structures Reports [2]

[Persons who wish to be notified of new publications in the Building Materials and Structures series as soon as they are available should write to the Superintendent of Documents, Government Printing Office, Washington, D. C., asking that their names be placed on the special mailing list maintained by him for this purpose.]

BMS47. Structural properties of prefabricated wood-frame constructions for walls, partitions, and floors sponsored by American Houses, Inc. Herbert L. Whittemore and Ambrose H. Stang with the collaboration of Thomas R. C. Wilson, Forest Products Laboratory. Price 10 cents.

BMS51. Structural properties of "Tilecrete Type A" floor construction sponsored by the Tilecrete Co. Herbert L. Whittemore, Ambrose H. Stang, and Douglas E. Parsons. Price 10 cents.

BMS53. Structural properties of a masonry wall construction of "Munlock Dry Wall Brick" sponsored by the Munlock Engineering Co. Herbert L. Whittemore, Ambrose H. Stang, and Douglas E. Parsons. Price 10 cents.

Technical News Bulletin [2]

Technical News Bulletin 280, August 1940. Price, 5 cents. Annual subscription, 50 cents.

MIMEOGRAPHED MATERIAL

Letter Circulars

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC604. List of Commercial Standards. (Revised to July 1, 1940.) (Supersedes LC589.)

[2] Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents per year; Journal of Research, $3.50 per year (to addresses in the United States and its possessions, and in countries extending the franking privilege); other countries, 70 cents and $4.50, respectively.

RECENT BUREAU ARTICLES APPEARING IN OUTSIDE PUBLICATIONS [3]

Two-draft weighing of motor-truck loads. C. L. Richard. Am. Miller (National Miller Publications, Inc., 330 South Wells St., Chicago, Ill.) **68,** No. 8 (August 1940).

Erratum: Hue, saturation, and lightness of surface colors in chromatic illumination. Deane B. Judd. J. Optical Soc. Am. (Massachusetts Institute of Technology, Cambridge, Mass.) **30,** 296 (1940).

Instructions for determining the color names for drugs and chemicals. Kenneth L. Kelly. Bull. Nat. Formulary Committee (Amer. Pharmaceutical Assn., Washington, D. C.) **8,** No. 11, p. 359 (August 1940).

[3] These publications are not obtainable from the Government. Requests should be sent direct to publishers.

Electrodialytic estimation of ash and of acidic and basic groups in textile fibers. Arnold M. Sookne, Charles H. Fugitt, and Jacinto Steinhardt. Textile Research (65 Franklin St., Boston, Mass.) **10,** 380 (July 1940), and Am. Dyestuff Reporter (90 William St., New York, N. Y.) **29,** 333 (July 8, 1940).

Relation of cation-exchange to the acidic properties of cotton. Arnold M. Sookne and Milton Harris. Textile Research **10,** 405 (August 1940); Am. Dyestuff Reporter **29,** 357 (July 22, 1940).

Silver in industry: Lawrence Addicks, A. J. Dornblatt, and others. Book giving results of research at the Bureau and elsewhere, sponsored by American Silver Producers. Reinhold Publishing Corp., 330 West 42d St., New York, N. Y.

U. S. GOVERNMENT PRINTING OFFICE: 1940